Global Ocean Monitoring and Observing
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION

Arctic Research Program, Distributed Biological Observatory, and Observations

Phyllis Stabeno
Pacific Marine Environmental Laboratory
Ecosystem and Fisheries Oceanography Investigations

Project Overview

ARP and Ecosystem and Fisheries Oceanography Investigations (EcoFOCI) have worked closely together for the last 8 years. EcoFOCI mission:

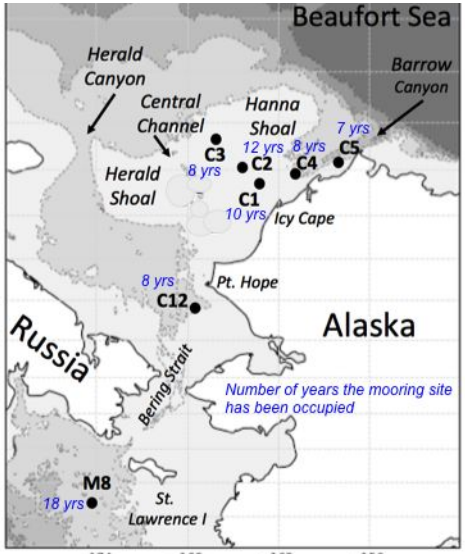
….. to study the ecosystems of the North Pacific Ocean, Bering Sea and U.S. Arctic to improve understanding of ecosystem dynamics and apply that understanding to the management of living marine resources.

complements the goals of ARP.

shared shiptime - maintained long-term observations (moorings) - investigate ecosystem structure - improved technology - provide information to managers, modelers and stakeholders

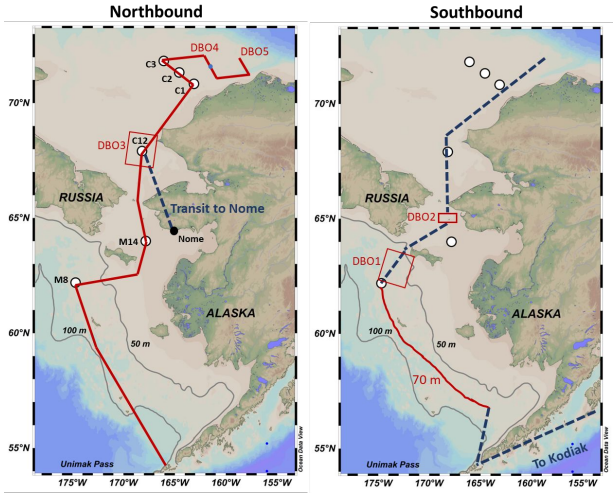
GOMO Linkages

Long-term moorings

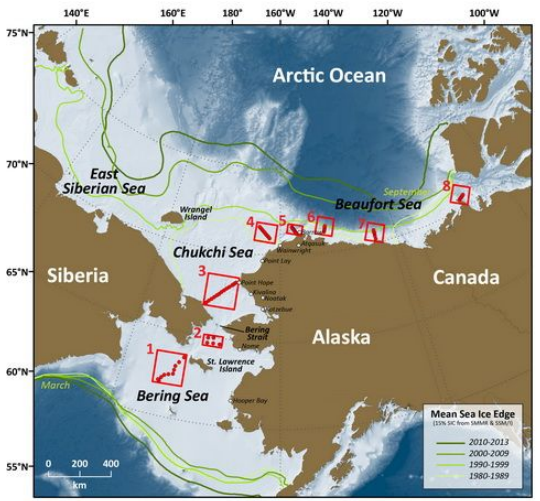


Maintain Observing System: EcoFOCI (funds from ARP and EcoFOCI) maintains NOAA's Arctic moorings

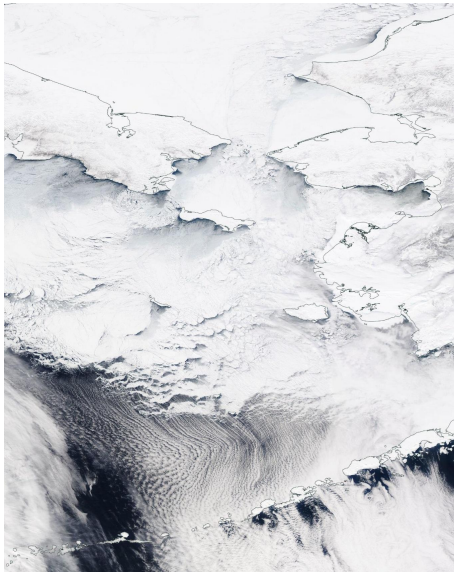
Shared shiptime: ARP and EcoFOCI jointly apply for NOAA shiptime to conduct an Arctic Cruise each year.



2022 Arctic Cruise



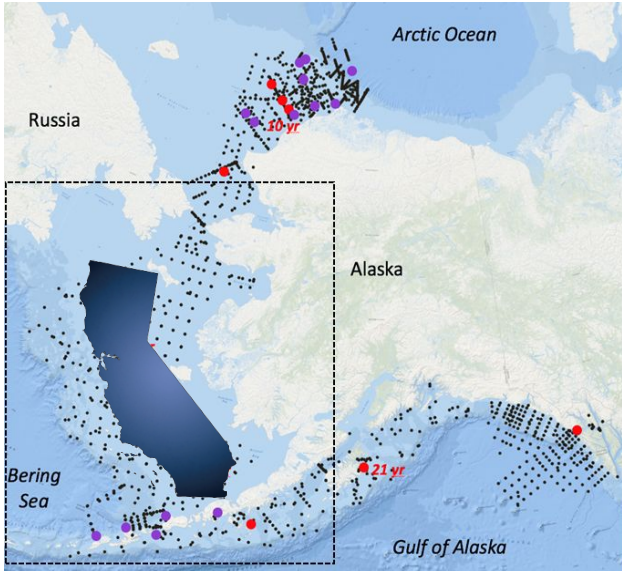
Contributes to the Distributed Biological Observatory: With support from GOMO/ARP

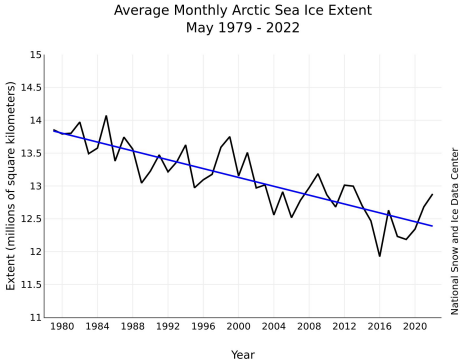


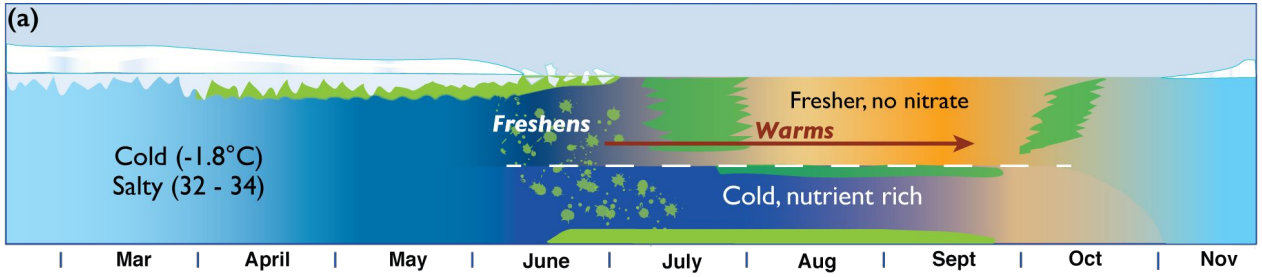
Working in the US Arctic

- Remote
- Immense
- Ice covered (> 8 mo. per year in the north)
- Complex Ecosystem
- Rapidly changing

,



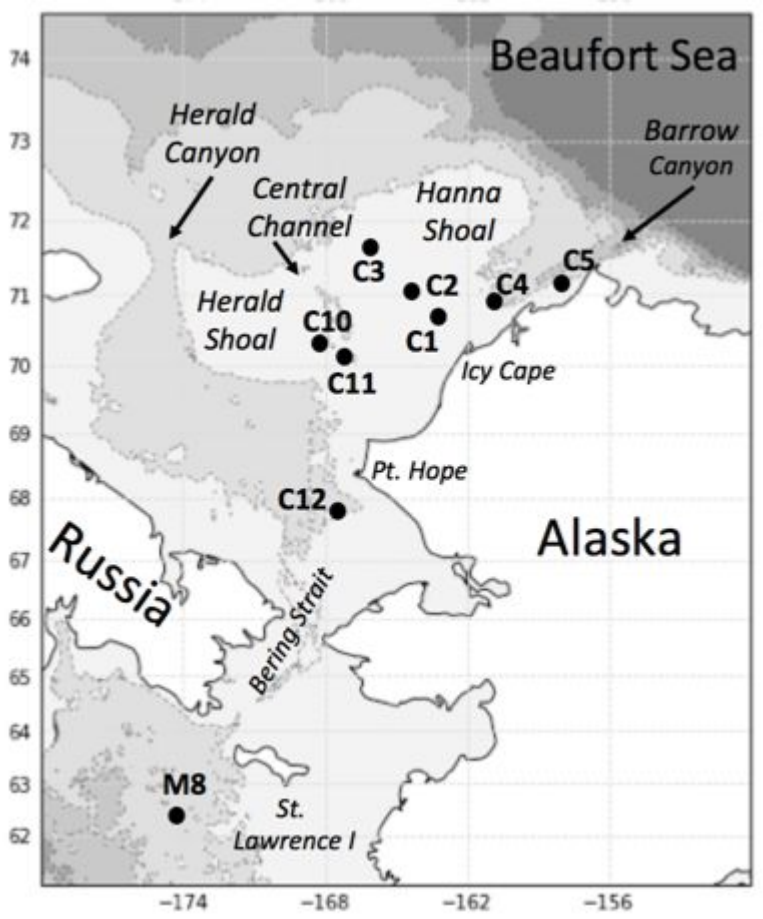




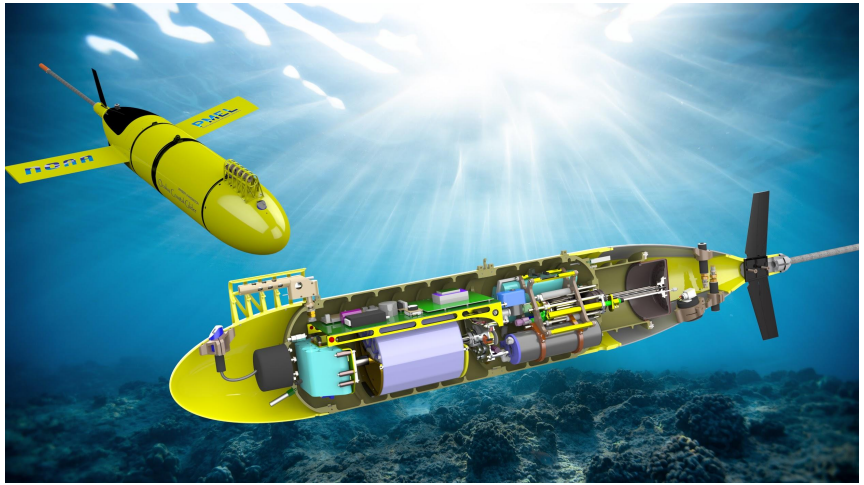
Long-term Moorings:

C1: 10 years
C2: 12 years
C3: 8 years
C4: 8 years
C5: 7 years
C12: 8 years
M8: 18 years

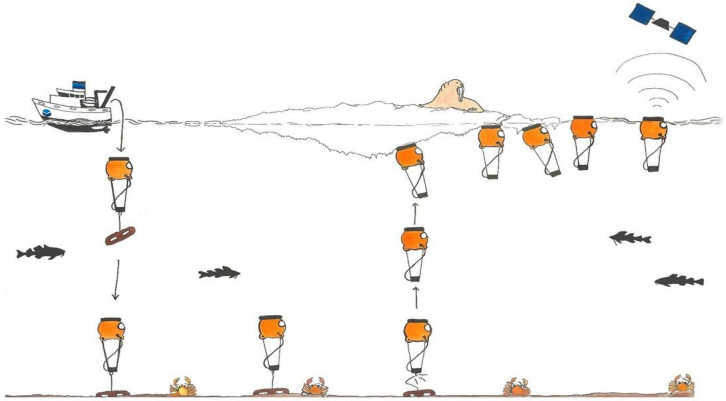
Temperature, salinity, nutrients, fluorescence, oxygen, PAR, currents, passive acoustics (marine mammals), sea-ice keel depth



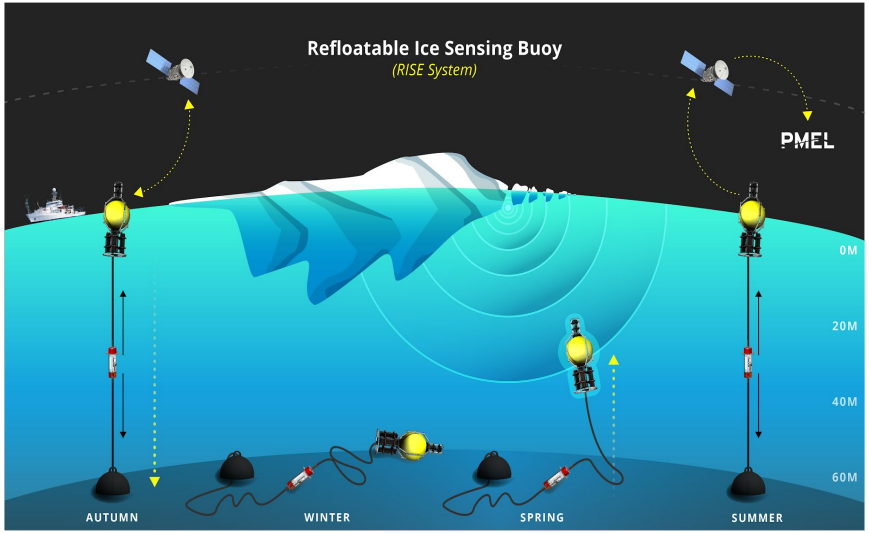
New Technology
(supported by ITAE)



Oculus Glider



Pop-up Float (*PUF*)



Refloatable Ice-Sensing Buoy (*RISE*)

Major Partnerships

Federal and State

Alaska Fisheries Science Center including the Marine Mammal Lab, Northwest Fisheries Science Center, State of Alaska, NASA, NSF

Universities

University of Washington, Oregon State University, University of Alaska Fairbanks, University of Hawaii, Applied Physics Lab, Bigelow, University of Maryland

International

PICES North Pacific Marine Science Organization
PAG (Pacific Arctic Group)
DBO (Distributed Biological Observatory)
BIOPOLE (Biogeochemical processes and ecosystem function in changing polar systems and their global impacts) 2022 – 2027

Communities

Little Diomede... A large late February storm caused considerable damage on Little Diomede Island. As a result of the storm, the community lost power and ice rubble covered beaches, the helipad, and damaged the water treatment plant.

Shishmaref... Freeze-up was unusually late in Shishmaref. Even when the surrounding area appeared to have ice, there was a stretch of open water around the community into mid-January. After the ice finally formed, it repeatedly broke up during storms allowing surf to push large ice chunks onto beaches.

Shishmaref, 2017

An open lead in the sea ice near Shishmaref, Alaska on 19 May 2017. Photos courtesy of Curtis Nayokpuk.

Gambell... Near Gambell, vast stretches of open water extended all the way to Russia until mid-March. During this time, local experts and Sea Ice for Walrus Outlook contributors reported a lack of walrus in the area.

Savoonga... After February's lack of ice, winds shifted abruptly on March 9 bringing sea ice back to Savoonga. Even as ice returned, local resident Aqef Waghiyi reported that "it is all broken up... no flat pieces and it is real rough. There are patches of open water... biggest open patch in front of town is maybe as big as a football field."

Subsistence hunters adapt to a warming Alaska with new tools

PRI's The World

February 22, 2018 · 3:45 PM EST

By Zachariah Hughes

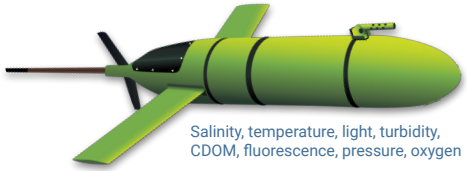
Listen to the story.

Subsistence hunter Dennis Davis sends his drone out over the ice on the Chukchi Sea in Shishmaref in far-western Alaska. Warming winters have made the sea ice here more dangerous to navigate in search of seals and walruses, but drones can help map the best route to the ice edge.

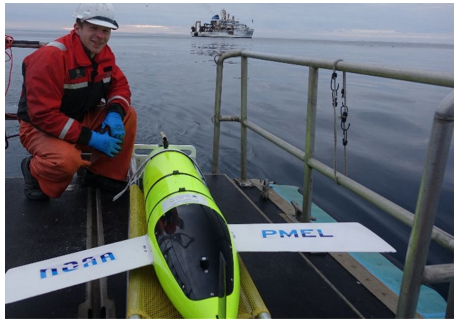
Credit: Zachariah Hughes

Working with Communities

Whaling commission
Partnership of collecting data
Arctic Waterways Safety Committee

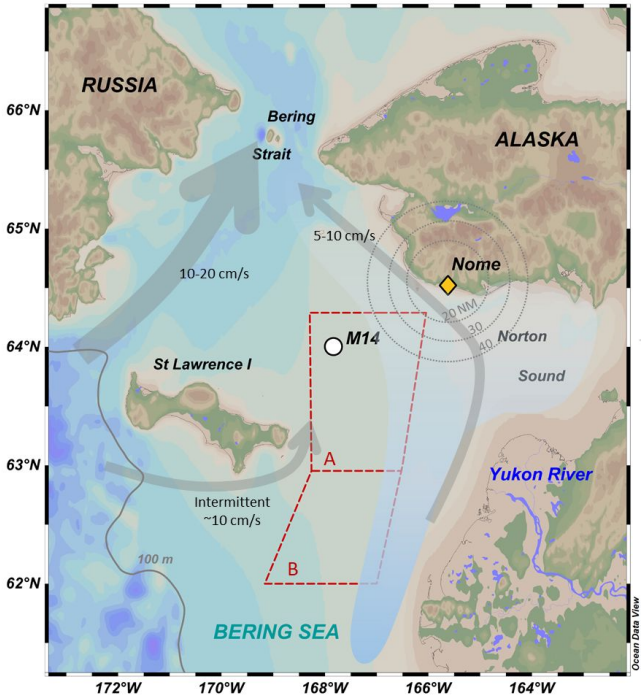


Community partnership: Oculus



Oculus Gliders: Drones off Nome's Shores

This summer, NOAA will use gliders deployed from Nome to study the changing oceanography of the northern Bering Sea.



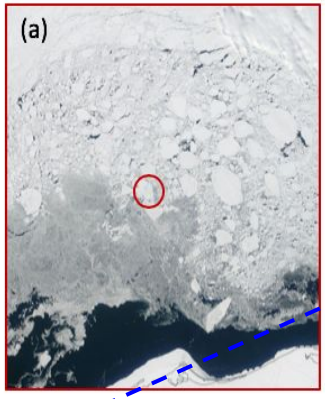
Fishing vessels deploy

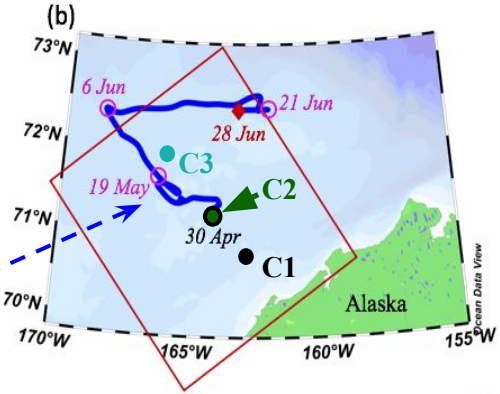
Pop-up Buoy (May1 –June 28, 2019)

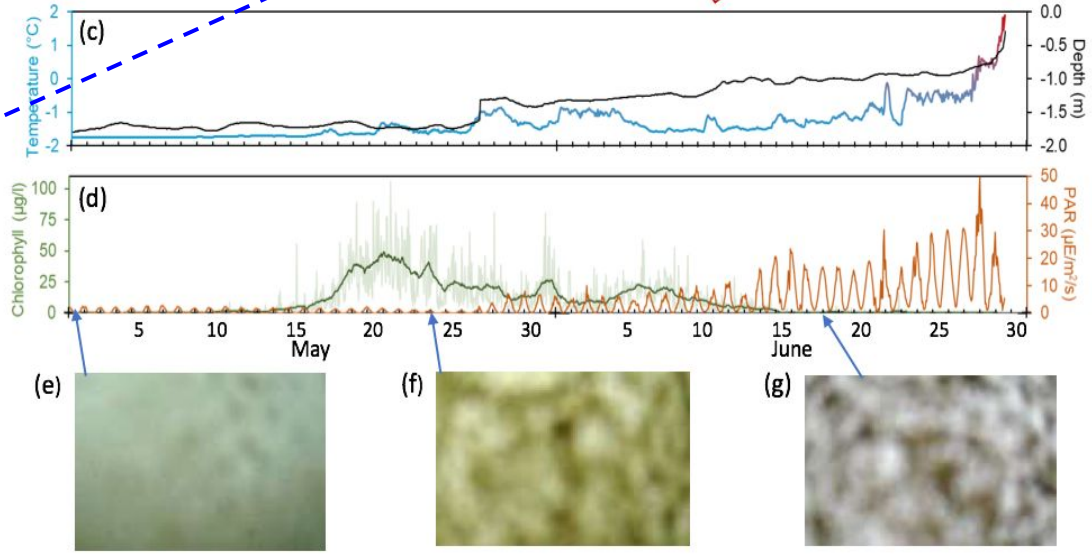
Popped up under ice floe.

The flow was tracked for almost two months.

Under ice temperature, fluorescence, PAR were collected along with photos

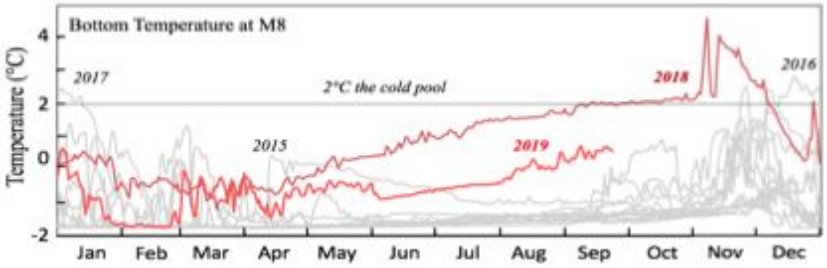


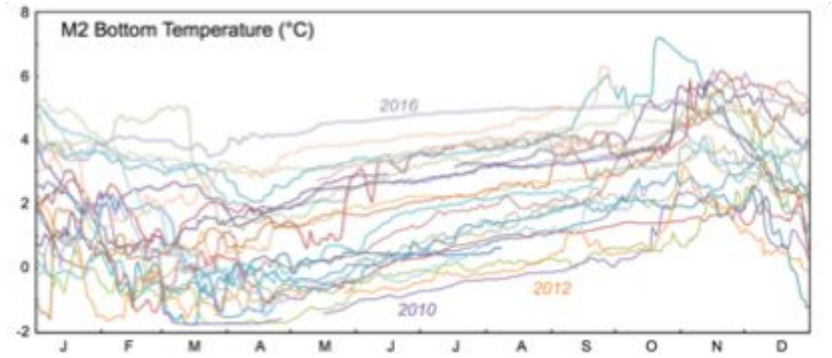


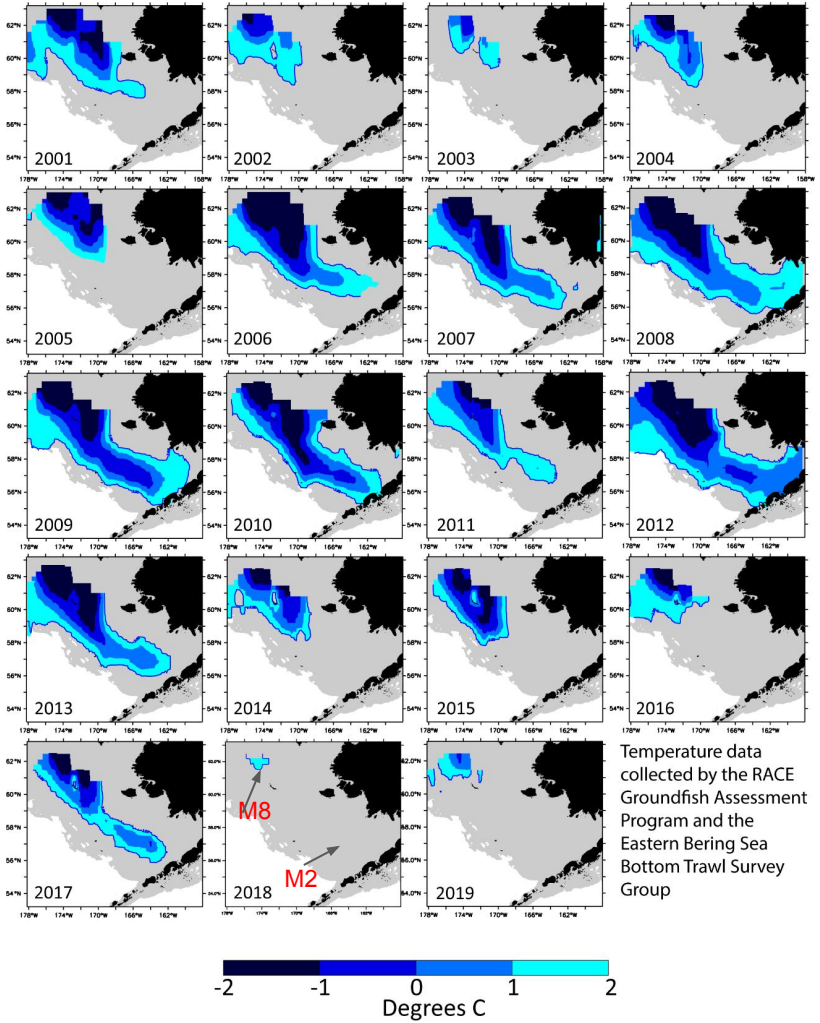


Heatwaves

From long-term Moorings







Temperature data collected by the RACE Groundfish Assessment Program and the Eastern Bering Sea Bottom Trawl Survey Group

Achievements and Impacts

- High-level highlights from previous 5 years: 2017-2021

  True partnership, long-term moorings, understanding currents, whale migrations

- Impact of this program/network: what is the impact to the scientific community, ocean observing enterprising, and the American taxpayer?

  Critical observations, informed models, implication of changing ice, Arctic New Normal, Green Economy